widely distributed, having been found in aqueous extracts of spleen, pancreas, liver, kidney, brain, muscles and blood serum. Infusoria, insects, worms and molluscs were also examined, with positive results.

THE additions to the Zoological Society's Gardens during the past week include two North African Jackals (*Canis anthus*) from Algeria, presented by Mr. G. E. Hope; a Rhesus Monkey (*Macacus rhesus*) from India, presented by Mrs. Mould; a Suricate (*Suricata tetradactyla*) from South Africa, presented by Captain R. Feilden; a Leopard (*Felis pardus*) from Africa, presented by Captain G. Burrows; two Stanley Cranes (*Anthropoides paradisea*) from South Africa, presented by Mr. A. W. Guthrie; a Yellow-cheeked Amazon (*Chrysotis autumnalis*) from Honduras, presented by Mrs. Bullock; a Rough-legged Buzzard (*Archibuteo lagopus*) from Norway, presented by Dr. E. A. Williams; a Leopard Tortoise (*Testudo pardalis*) from South Africa, presented by Major J. Day; five Leith's Tortoises (*Testudo leithi*), eight Basilisk Chameleons (*Chamaeleon basiliscus*), two Common Chameleons (*Chamaeleon vulgaris*), three Schneider's Skinks (*Eumeces schneideri*) from Egypt, presented by Mr. Stanley S. Flower; a Spix's Macaw (*Cyanopsittacus spixi*) from North Brazil, two Barbary Wild Sheep (*Ovis tragelaphus*) from North Africa, a West African Python (*Python sebae*) from West Africa, fourteen North American Trionyx (*Trionyx ferox*), six Lesueur's Terrapins (*Malacoclemmys lesueuri*) from North America, seven Roofed Terrapins (*Kachuga tectum*) from India, two South American Rat Snakes (*Spilotes pullatus*) from South America, three Cunningham's Skinks (*Egernia cunninghami*) from Australia, two Wallace's Lories (*Eos wallacei*) from Waigiou, a New Zealand Parrakeet (*Cyanorhamphus novae-zealandiae*) from New Zealand, deposited; two Spoonbills (*Platalea leucorodia*), European, purchased; a Burrhel Wild Sheep (*Ovis burrhel*), a Squirrel-like Phalanger (*Petaurus sciureus*), two White Ibises (*Eudocimus albus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

SPECTRUM OF NOVA PERSEI.—In the current issue of *Comptes rendus* (vol. cxxxii. pp. 1542-1544) M. Deslandres gives a third series of observations of the spectrum of Nova Persei as obtained at the Meudon Observatory. Since the previous communication, spectrographs of varying power have been installed for use with the two telescopes of 0·84 metre and 0·60 metre aperture, and both photographic and visual records of the spectrum obtained during the periods of minima, although unfavourable weather has considerably interfered with their continuity. In this later work special attention has been devoted to the expected detection of the principal nebular lines. M. Deslandres states that during the first stages the principal green lines present were distinctly not the nebular lines, but the lines of parhelium, λ492 and λ5015, this being well shown in a photograph taken on March 3. On a plate taken on April 17, however, the measured position of the chief green line was λ5008, but on account of breadth of line the value is of course only approximate. The star was near its minimum brightness on this date. The gradual varying intensity of this line relative to the Hβ line of hydrogen is then described, the details being in close agreement with those already published by other observers.

On May 14 a fainter line was seen near the next nebular line, about λ4959, the star being less than 7th magnitude, and he concludes that at that time the spectrum of the Nova was completely nebular, also mentioning that M. de Gothard had detected the ultra-violet nebular line λ386 in the spectrum of the star.

DARK SPOT ON JUPITER.—In the *Astronomische Nachrichten* (No. 3724) Mr. T. E. R. Phillips gives the results of several observations by others and himself extending from March 2 to June 2.

The spot as seen by these observers is in the white north tropical zone, in about latitude $+15°$. At present it appears to be quite detached from the northern edge of the north equatorial belt, but when first seen gave the impression of being merely a dark projection from that belt into the north tropical zone. Possibly the reason for the present appearance is the apparent narrowing of the belt which has been observed for some time past.

A table is given showing the results of nine determinations, the discussion of which indicates a period of 9h. 55m. 29·7s.

THE METEORIC EPOCH OF JULY AND AUGUST.

METEORS are generally rare in the early part of the year, and, in May and June, twilight is so strong that it obliterates faint objects and leaves only the more conspicuous class of meteors observable. But in July, though the sky is still very light and the nights extremely short, these objects become fairly plentiful and particularly so during the last week of the month, when the horary rate of apparition is about three times as great as it is on ordinary nights of spring and midsummer. The meteoric observer regards July and August not only as one of the most productive seasons of work, but one which in the interesting character of its results will compare favourably with that of any other epoch of the year.

There is a rich shower of Aquarids annually visible on about July 27-31, and apart from this stream the great system of Perseids, which has rendered the month of August so famous in meteoric annals, has actively commenced and supplies no inconsiderable proportion of the shooting stars visible at the close of July. Other showers are plentifully distributed over the firmament, but the majority are very feeble and may only be distinguished by close and prolonged watching during several clear nights.

The writer recently undertook the rediscussion of about 260 meteors which he has recorded from the shower of Aquarids, in various years, with a view to discover whether there were any indications of motion in the radiant. Grouping the observations into short periods and deducing the place of the radiant for each of them, it was found that no displacements occurred other than those which might be fairly attributed to errors in registering the paths. The radiants came out as follow:—

	α	δ	
	°	°	
July 23-25	335	− 11	11 meteors
July 26-31	338	− 12	190 ,,
August 1-5	337	− 12	18 ,,
August 6-13	335	− 11	12 ,,
August 14, 1887 ...	335	− 10	5 ,,
August 18-25	339	− 11	20 ,,

The centre of radiation, like that of the October Orionids, appears, therefore, to be motionless, and it continues visible for more than a month. In observing this stream care must be taken not to confuse it with two other pretty rich and contemporary showers at $345° \pm 0°$ and $339° - 30°$. The latter is near the bright southern star Fomalhaut.

In this department the observer's efforts have to be regulated in a great measure by moonlight, and this year our satellite will interfere in the earlier and later part of July. But it is probable that, with suitable weather, the first indications of the Perseid display may be well observed on about July 11-15. As the radiant centre of this system travels E.N.E. with the time, the observer should keep his materials for each night separate, and determine the place of radiation on every date when the conformable paths are adequate for that purpose. This position can scarcely be defined, either with safety or accuracy, when less than five well-observed meteors have been registered from it. But it is often satisfactorily obtained when two observers at separate stations record the same meteor. In a case like this the evidence is conclusive as to the position of the radiant, though it may be rendered a little inexact by errors of observation. But in instances where meteors are seen at one place only there are possibilities of mistake in attributing the radiants, for these have necessarily to be assumed from the directions of flight and visible aspect of the objects observed. In the case of the Perseid shower there is not, however, much probability that serious errors will occur in this respect, but everything depends upon the discrimination and discretion of the observer.

In recent years many amateurs have participated in systematic observations of the Perseids, and the number of doubly observed meteors has been greatly augmented. In July, 1900, three early Perseids were recorded in duplicate and gave heights and radiants as follow:—

	Height at beginning. Miles.	Height at end. Miles.	Radiant. ° °
July 19	81	54	17+50
,, 23	84	55	24+52
,, 30	95	50	30+52

In time it will be possible to accumulate a sufficient number of these observations to assign the radiant on every night during the last half of July. There will certainly be small errors in the individual positions, and they will not absolutely agree in showing the regular progression of the radiant eastwards, but the mean places derived from a considerable number of meteors will no doubt yield very satisfactory results.

In previous years much has been effected at the July and August epoch, but still more remains to be done. Photography, of which so much was expected, has achieved little, but its possibilities are great and it may ultimately prove as successful in this department as it has done in several others. The fact, however, remains that we are still mainly dependent upon eye observations, though they are no more than rough and hurried estimates of position, and scarcely capable of being usefully employed in any refined or critical investigations of the subject. But with care and long practice it is possible to acquire a degree of accuracy which would hardly have been credited, and we must not forget that some important conclusions have been safely based on rough eye observations. The virtual identity of comets and meteors has been established, the heights and velocities of meteors approximately determined, while the positions of some hundreds of radiants have been ascertained with fair accuracy. Features such as the motion of the Perseid centre, the stationary aspect of the Orionid and certain other radiants, and the large area of radiation of the meteors of Biela's comet, have been demonstrated. But much additional data are required, and as photography has hitherto supplied very meagre results, observers have to fall back upon the old-time method as vastly more productive if far less precise. It will be remembered that some years ago it was thought that the photographic plate would soon supersede the observer in regard to the delineation of planetary detail, but this idea has not been realised. It is true that planetary and meteoric observations are different and therefore not strictly comparable, but we have gained enough experience to see that the meteoric observer is in no immediate danger of being displaced.

W. F. DENNING.

THE "EDISON" STORAGE CELL.

CONSIDERABLE interest was aroused a short time ago by the announcement that Mr. Edison had invented a new secondary battery. As was only to be expected of a rumour, circulated mainly by the lay Press and dealing with one of Mr. Edison's inventions, it was said that the new cell was going to revolutionise entirely the electrical storage of energy and to throw open to the undisputed control of the electrical engineer the much-desired field of motor-car work. Fortunately, in this case, even if rumour has been somewhat extravagant, it has not been without foundation. Mr. Edison has in reality invented a new storage cell which is novel in principle and full of promise. A full description of the invention was given by Dr. A. E. Kennelly at the annual meeting of the American Institute of Electrical Engineers on May 21, and we are able, from a reprint of this paper which appeared in the *Electrical Review* of New York (May 25), to obtain data for a preliminary consideration of the merits of the cell.

Mr. Edison—like many other inventors, only with more success than is met with by most—set out with the object of devising a cell which should possess the following merits:—(1) Absence of deterioration by work, (2) large storage capacity per unit of mass, (3) capability of being rapidly charged and discharged, (4) ability to withstand careless treatment, and (5) inexpensiveness.

It will be best first to describe the solution that Mr. Edison has offered, and then to examine, as far as is possible from the information available, to how great a degree the above requirements are satisfied. The problem thus clearly stated by Dr. Kennelly is one which has been long realised by all interested in the matter, and by none, perhaps, more than by the makers and users of motor-cars. The one great difficulty in the construction of a good electrical motor-car, or in the equipment of a satisfactory system of accumulator tramways, has been the want of a suitable storage cell. If this were only provided, we have been told, then the electrical motor-car would know no rival, seeing that it would be free from all the objectionable noise and smell incidental to petroleum automobiles. It is, therefore, most earnestly to be hoped that the new Edison cell will do all that is claimed for it.

The cell is an entirely new departure in storage batteries, the materials used in its construction being iron and nickel oxide. The active material of the negative plate of the cell consists of iron, that of the positive plate of a superoxide of nickel believed to have the formula NiO_2. Thus the iron corresponds to the spongy lead and the oxide of nickel to the lead peroxide of a lead accumulator. The electrolyte used is an aqueous solution containing about 20 per cent. by weight of caustic potash. The E.M.F. of this combination—iron, potassium hydrate, nickel superoxide—is about 1·5 volts when fully charged and falls to about 1·15 at the end of the useful discharge. At the end of the discharge the iron is oxidised and the nickel oxide reduced; the charging process carries back the oxygen through the potash solution from the iron to the nickel plate, the energy being thus stored in the reduced iron, which, though unaffected by the solution in ordinary circumstances, is reoxidised when the cell is allowed to discharge. The solution, therefore, does

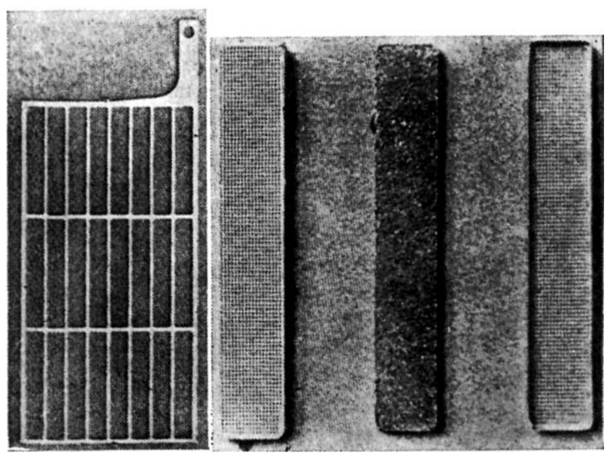

FIG. 1.—Grids and Briquettes, Edison Storage Battery. (From *The Electro-Chemist and Metallurgist*.)

not apparently enter at all into the chemical action which takes place, but only serves as a vehicle for transporting oxygen from the one plate to the other; this is of considerable advantage, as it allows a minimum of solution to be employed.

The mechanical construction of the two plates is identical, the only difference between them being in the active material used. The plates are made of comparatively thin sheets of steel (a little more than 0·5 mm. thick), out of which rectangular holes or "windows" are stamped. In the plates exhibited there were three rows of eight such windows, these holes occupying, of course, by far the greater proportion of the area, the steel framework being merely sufficient for strength and rigidity. Into these holes are fitted small nickel-plated steel boxes containing the active material in the form of closely consolidated briquettes. These boxes are somewhat thicker than the grid, being about 2·5 mm. thick in the finished plate, and are perforated, back and front, with numerous small holes to allow access of the electrolyte to the active material. The general appearance of the grid and briquettes can be seen from Fig. 1.

The positive briquettes are made by mixing a finely divided compound of iron with a nearly equal volume of thin flakes of graphite, the graphite being added to increase the conductivity of the briquettes. The mixture is pressed in a mould under an hydraulic pressure of about two tons per square inch. The surface area of each face of the briquette is about 3 inches by ½ inch. The negative briquettes are made in a precisely similar